UNITED STATES MARINE CORPS
Basic Officer Course
The Basic School
Marine Corps Combat Development Command
Quantico, Virginia 22134-5019

B2127

INTRODUCTION TO MACHINE GUN EMPLOYMENT

Student Handout

1. **General Employment Considerations**

a. M60E3/M240G

(1) Offense. Best used in a support by fire (SBF) to provide heavy volume of accurate suppressive fire. Consider defilade if you can provide an observer with communication to the guns.

(2) Defense. If terrain allows grazing fire, employ to flanks and assign interlocking, grazing FPLs across unit's frontage. If terrain will not permit FPLs, assign PDFs along likely avenues of approach. Any given gun can be assigned only a PDF or a FPL but not both. Many situations will allow you to assign FPLs to some guns, and PDFs to others. Do not forget the large number of SAWs available to cover avenues of approach and to duplicate fires of some of your guns.

b. Heavy machine guns. M2 and MK19 are both in the Heavy Machine Gun Platoon of the infantry battalion. Only six can be employed at a time by the platoon, so select the mix, if any, of guns you require to accomplish your mission.

(1) Effects against armor. MK19 is best with a maximum effective range of 1500 meters, with armor penetration of 2" of homogeneous steel out to 2,200 meters. Armor penetration of the M2 decreases dramatically with increased range. The M2 can not penetrate the frontal armor of a BMP past 600 meters.

(2) Effects against personnel. M2 is best, due to higher volume of fire and 1000 meters of grazing fire. Well suited to either FPL or PDF in the defense. The MK19 is also very effective against personnel due to its 15 meter ECR.

(3) In the attack. Mix the guns for desired effect. Pin enemy down with accurate suppressive fires from M2 and hit him with MK19. If he attempts to run from the MK19 fires, he presents himself as a target to the M2. This is the combined arms concept at work using organic infantry weapons.

(4) In the defense. The MK19 is assigned PDFs to cover avenues of approach, obstacles, defiles, choke points or dead space. Remember that this weapon cannot fire a FPL because of the nature of its ammunition. Slower rates of fire and high explosive ammunition are perfectly suited for PDF missions in the defense. The M2, however, is well suited for FPLs due to its 1000m of grazing fire and high volume of fire. All heavy machine guns are well suited to be employed from positions to the rear of front lines, in order to take advantage of their longer range capabilities by firing overhead of friendly troops. This provides greater protection for these guns, and offers maneuverability in employing them from a variety of locations as the situation demands.

(5) Effects against aircraft. Limited at best. Most effectively employed against helos or slower fixed wing aircraft. Use the M2 for best results.

(6) Effects of firing through vegetation. M2 will fire effectively through almost any vegetation. MK19 rounds will be severely affected by vegetation, in most cases causing premature detonation of rounds.

(7) Indirect fire. Both weapons are capable of indirect fire. MK19s can be very effective when employed from friendly reverse slopes against enemy reverse slopes. Observers are required in all cases to spot the impact of rounds and to relay adjustment data to the guns.

(8) Complimentary effects. Heavy MG Platoon can fire six guns, in any mix, simultaneously. Mix for desired results.

2. **Concept of Employment.** Careful planning is required in order to maximize the effectiveness of all available machine gun assets. You must specifically determine the role of all weapons systems to support your tactical operations. During offensive operations the commander's decision on how he will employ his machine guns will be based on the following four tactical classifications of machine gun fire:

a. Close support fires. Fires delivered against enemy objectives directly opposing the advance of the attacking rifle units.

b. Long range fires. Fires delivered against targets in the rear of enemy forward positions. Terrain permitting, long range fires are often assigned to machine guns when they can no longer provide close supporting fire to the attack.

c. Flank protection fires. When the location or advance of an infantry unit creates an open or exposed flank, the machine guns are employed to protect it.

d. Fires in support of consolidation. Enemy counterattack should be expected following seizure of an objective. Machine guns are used to protect the unit's consolidation and reorganization. Employment of the guns on the objective should be preplanned and rapidly executed, and many of the machine guns will have to be displaced from SBF positions. The M249 SAW will provide immediate automatic firepower forward in support of consolidation until the medium and heavy machine guns displace. After the seizure of an enemy position or when the machine guns can no longer provide fire support from their positions, it will be necessary to move them to a new location. This movement is referred to as a "displacement." It is essential that this displacement be as rapid as possible in order to continue the mission of fire support or protection. Displacement methods are:

(1) Echelon: When echelon or "leap frogging" is employed, one or two squads remain in position while the other(s) displace. This method ensures that fire support or protection to the assaulting elements is uninterrupted. When the machine gun section displaces by echelon, the section leader displaces with the first element(s) to select new firing positions and to assign targets.

(2) Unit: Upon seizure of an objective, the machine guns may no longer have a mission from their old positions. Since it is extremely important to have the guns on the objective to cover reorganization, they may then displace as a unit.

(3) The machine guns normally displace by squad and only under the strictest necessity will a squad be split and displace by team.

e. The machine guns of the Weapons Platoon and of the Heavy Machine Gun Platoon will support the infantry from any one of three methods of employment:

(1) General support: When placed in general support, the guns fire in support of the entire unit. The commander retains control of his most responsive fire support units, and can influence the battle by adjusting their employment to the changing situation. This is the preferred method of employment, especially since the Platoon Commander has nine SAWs of his own.

(2) Direct support: A unit in direct support is assigned the mission of providing the fire requested by the supported unit. The unit being supported requests fires directly from the supporting unit commander. The supported unit commander assigns the guns a mission and targets.

(3) Attachment: Attachment is the placement of a unit in an organization where such placement is relatively temporary. The organization to which a unit is attached assumes complete tactical and administrative control over the unit, subject to any limitations (usually time) stipulated in the attachment order. Machine guns may be attached to a rifle platoon which cannot be supported from general or direct support positions because of the terrain or other conditions. The introduction of nine M249 SAWs to the rifle platoon has significantly reduced the occasions when the attachment of machine guns to the platoons would be warranted.

3. **Characteristics of Machine Gun Fire**

a. Trajectory: Arcing flight of a bullet, or bullets, through the air.

b. Ordinate: Elevation of flight path above the line of sight.

c. Maximum ordinate: Two-thirds of distance to target.

d. Cone of fire: Machine guns fire multiple bullets with each burst. These rounds do not travel along identical flight paths, and the paths of the bullets of any burst travel in a cluster are called cones of fire. The cone of fire for the M60E3/M240G is always two mils wide.

e. Beaten zone: The ground hit by the bullets is referred to as the beaten zone. Because the cone of fire of an M60E3/M240G is always two mils wide, the beaten zone is always two mils wide. Understanding the effects of range and terrain on the beaten zone allows the machine gunner to manipulate the effects of his fires.

(1) Uniform terrain: At short ranges the beaten zone will be long because of the initial trajectory and narrow because of the relatively short distance the bullet travels before it strikes the ground. As range increases, the beaten zone

will decrease in length because the bullets will be falling at a steeper angle, and increase in width as the rotation of the bullet further affects dispersion.

(2) Rising terrain: Terrain rising in the path of the cone of fire has the effect of abruptly stopping the rounds, and creates a small beaten zone which nearly duplicates the pattern of the cone of fire on steeply rising terrain.

(3) Falling terrain: When the terrain falls away before the gun, the beaten zone becomes longer, and depending on the range, either long and narrow or long and wide.

4. **Classifications of Machine Gun Fire.** Machine gun fires are normally classified in relation to the ground, the target and the gun. In order to maximize the effects of machine gun fires, it is necessary to be conversant in the following terms.

a. With respect to the ground:

(1) Danger space - when firing over terrain, and the trajectory of the round does not rise more than 1.8 meters above the ground (approximate height of the average man).

(2) Dead space - dead space exists any time a man's head drops below the line of aim/sight. This can be caused by streams, ravines and depressions along the line of aim/sight.

(3) Plunging - fire where the danger space is practically confined to the beaten zone. This can be attained by firing from low ground into high ground, high ground into low ground, and over long ranges.

(4) Grazing - fire approximately parallel to the ground where the center of the cone of fire does not rise more than one meter from the ground (see danger space).

b. With respect to the target:

(1) Flanking - fire delivered on the flank of a target, when the target is oriented 90 or more degrees away from the firing unit.

(2) Frontal - fire delivered on the front of a target, when the target is oriented on the firing unit.

(3) Oblique - fire delivered on the oblique of a target, when the target is oriented between 0 and 90 degrees to the firing unit.

(4) Enfilade - fire where the long axis of the beaten zone coincides with the long axis of the target. This fire is independent of the target's orientation and relies solely on the enemy's disposition of forces.

c. With respect to the gun:

(1) Fixed - little or no manipulation of the gun is required to obtain and maintain effect on target (can only be produced from a tripod with T&E).

(2) Traversing - fire delivered against a wide target requiring changes in direction. The beaten zones of each successive burst should be adjacent to each other if not overlapping (may be produced from either a tripod or bipod).

(3) Searching - fire delivered against a target in depth requiring changes in elevation. The beaten zones of each successive burst should be adjacent to each other if not overlapping (may be produced from either a tripod or bipod).

(4) Traversing and searching - fire delivered against an oblique target requiring changes in both elevation and direction. The beaten zones of each successive burst should be adjacent to each other if not overlapping (may be produced from either a tripod or bipod).

(5) Swinging traverse - fire delivered against targets which require major changes in direction with little or no change in elevation. The beaten zones of each successive burst need not be adjacent to each other (may be produced from either a tripod or bipod).

(6) Free gun - fire delivered against moving targets which require major changes in both direction and elevation. The beaten zones of each successive burst need not be adjacent to each other (can only be produced from a tripod or vehicle mount).

5. **Machine Gun Fighting Positions.** As time permits, machine gun crews prepare primary, alternate and supplementary firing positions that provide cover and concealment without restricting effective fire. In any of the positions covered here the gun

is lowered by digging firing platforms where the gun will be placed. The platforms must not be so low that the gun cannot traverse across its sectors of fire. Lowering the gun reduces the height of frontal cover required. In a three man crew, the ammunition bearer digs a one man fighting position to the flank where he can provide security for the gun, observe and fire into the crew's primary and alternate sectors of fire, and observe the gunner and assistant gunner. The ammunition bearer's position also allows him to bring ammo to or replace one of the gunners. When possible the two positions are connected by a crawl trench.

a. A primary firing position is a position from which the gun can fire on its primary sector of fire.

b. An alternate firing position is another seperate prepared position from which the gun can still fire on its primary sector of fire.

c. A supplemental position is another seperate prepared position from which the gun fires a secondary or alternate sector of fire.

d. "T"-shaped position. Preferred position. Provides primary and alternate sectors of fire and cover to the front. With the M60E3/M240G, the tripod is used on the side that covers the primary sector and the bipod legs are used on the side that covers the alternate mission. When changing from primary to alternate sides, the machine gun is moved, but the tripod remains in place. (Figures 1, 2, 3)

(1) The hole is dug about armpit deep. When frontal cover is high and thick enough, the spoilage is used to build flank and rear cover.

(2) Grenade sumps should be located at the end of each leg of the position.

(3) When only one sector of fire is assigned, only one half of the position is dug. ("L"-shaped position). The FPL must parallel either arm of the "L". This position should always be improved upon to make a "T" shape or horseshoe shape position. (Figure 4)

Figure 1. "T"-shaped position; firing primary sector.

Figure 2. Firing secondary sector.

Figure 3. Digging "T"-shaped position

Figure 4. No secondary section ("L"-shaped position.)

e. Horseshoe-shaped position. The open end of the horseshoe is toward the enemy. This type of position allows for easy 180-degree traverse across the front, but provides less frontal cover than the T-shaped position and less protection from indirect fire than the "T"-shaped position. (Figure 5)

(1) The firing platform is located within the horseshoe.

(2) Spoilage is used to provide cover all around the position.

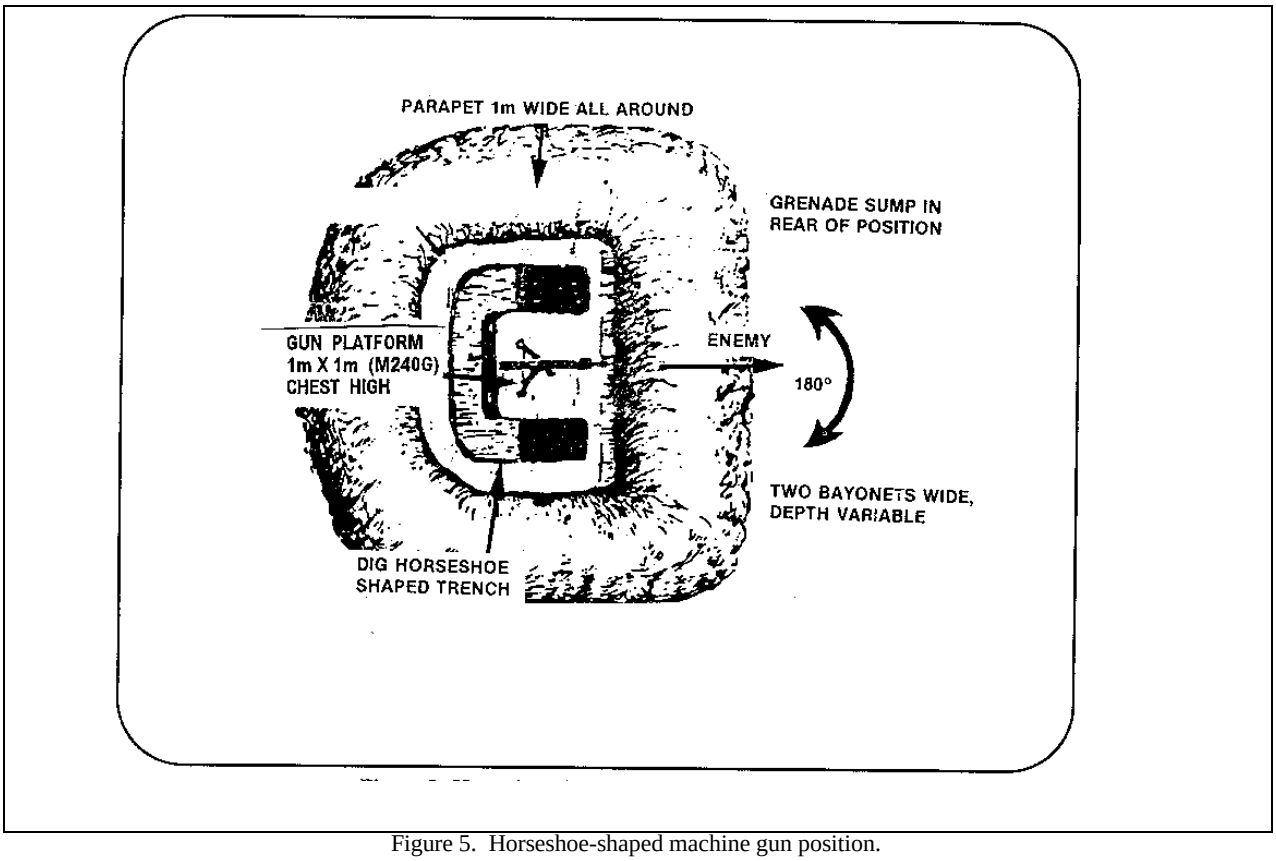

Figure 5. Horseshoe-shaped machine gun position.

f. Two-hole position. This position uses two one-man fighting holes at 90-degree angles. This position provides excellent protection for the gunner and assistant gunner, but allows only limited traverse of the gun. Each hole is dug as a standard one-man fighting hole. When switching from the primary to the alternate sectors of fire, the gunner and the assistant gunner switch roles. (Figure 6)

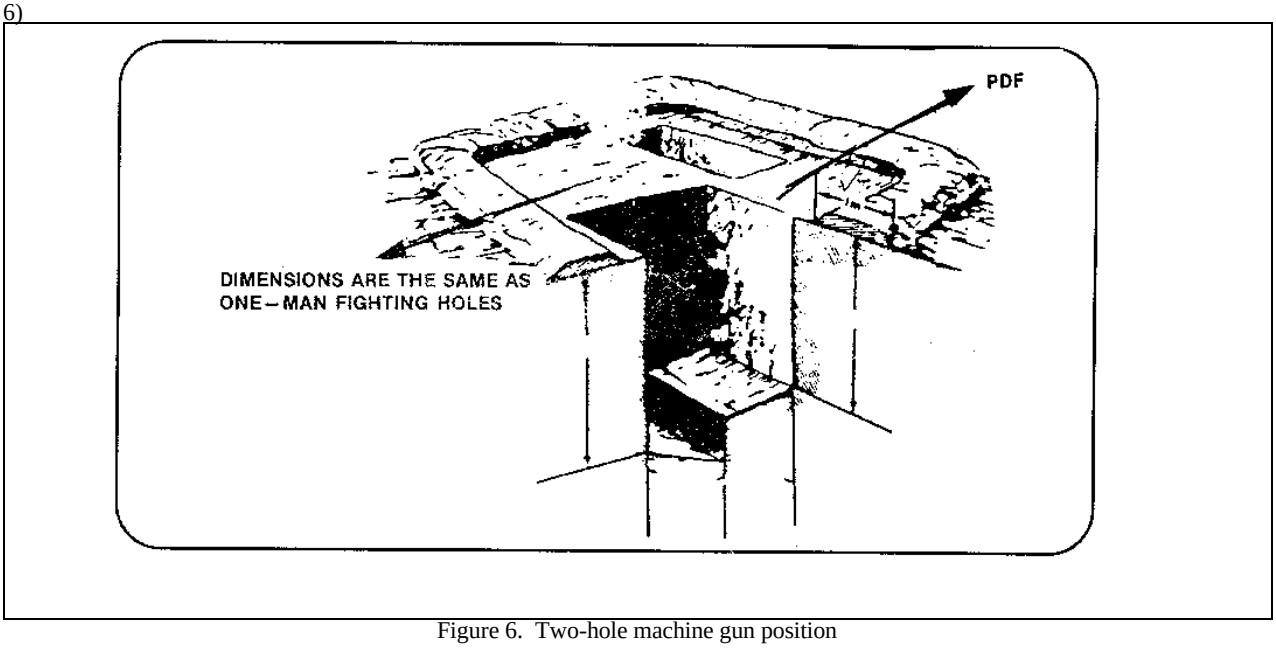

Figure 6. Two-hole machine gun position

6. **Range Determination**: As you read in the reading assignment, the machine guns are BZOed based on the squad leader's ability to estimate range effectively. The rangeplates of the rear sights are set to the squad leader's range estimations. There are a number of deliberate and field expedient techniques to estimate range. Select the most efficient and use it. Effective range estimation or determination cannot be over-emphasized.

7. **ADDRAC**

a. You are already familiar with the basic fire command or ADDRAC. The same fire commands are used, with minor modifications, to control the fires of a machine gun squad.

(1) Alert: Mandatory. FIRE MISSION = both guns fire. NUMBER ONE, FIRE MISSION = only one gun fires the mission. FIRE MISSION, NUMBER TWO = gun number two fires the mission, but gun number one tracks the mission and is prepared to support it immediately on command.

(2) Direction: (Only when not obvious).

(3) Description: (Only when not obvious).

(4) Range: Mandatory.

(5) Assignment/method: This element is used only if specific assignments are required to divide the target, assign a class of fire, or to designate a rate of fire.

(6) Control: Mandatory. Always used to control proper timing of commencement of fires.

b. Subsequent fire commands will always be required in order to adjust and control the missions as they progress. Subsequent fire commands will be used to:

(1) Adjust fires.

(2) Change rates of fire.

(3) Cease fire.

(4) End the mission.

8. **Predetermined Targets.** Discussed in previous classes. Used to determine firing data for use on range cards. Determination of target data will allow first-round hits on targets under any conditions of visibility. Can be used in offense or defense, but deliberate firing of machine guns could spoil surprise, and give away machine gun positions. In the defense, predetermined fires establish firing data for PDFs and FPLs, as well as other probable targets.

9. **Range Cards.** (See Appendix A.)

10. **Eight Principles of Machine Gun Employment (PICMDEEP)**

a. **P**- Pairs. Employ in pairs to retain squad integrity. Duplicate fires to ensure continuous fire support even if one gun goes down. Allows for talking guns, uninterrupted fires during immediate action drills, etc. A SAW may be substituted if the situation dictates but can only fire a PDF.

b. **I**- Interlocking fires. Interlocking fires reinforce and double the firepower employed across a unit's frontage and ensure that no area goes uncovered, especially when grazing fires intersect.

c. **C**- Coordination. Use of appropriate weapons to fire on appropriate targets in order to maximize effectiveness of all weapons systems employed, conserve ammunition for weapons not used, and conceal gun positions as long as possible.

d. **M**- Mutual support. If one gun is overrun, the other gun in the squad must be able to fire upon the position.

e. **D**- Defilade. Defilade fires allow the guns to fire from behind terrain masks, and to remain free from both enemy direct fire weapons and observation by enemy forward observers. Such fires can be extremely effective, and crew survivability will be dramatically enhanced. (See Figure 7.)

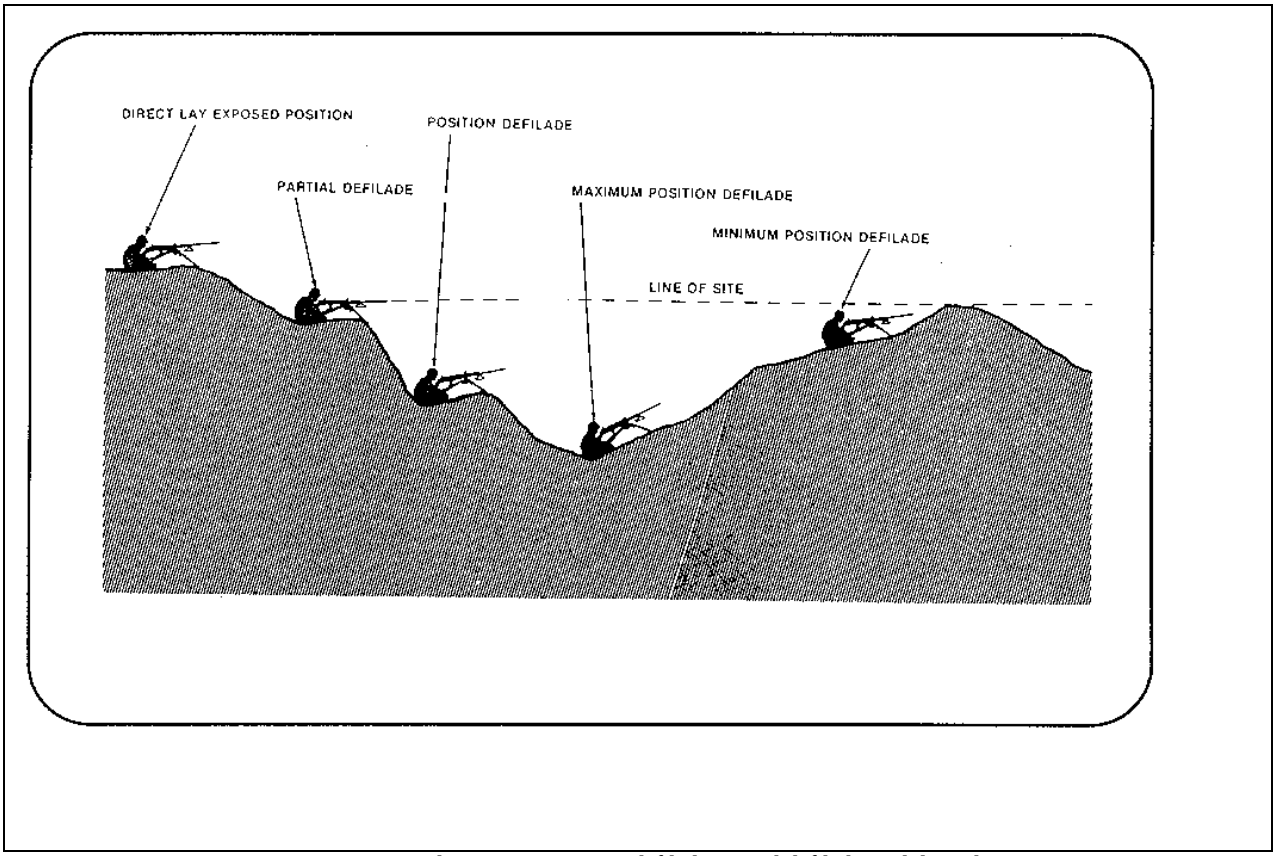

Figure 7. Minimum and maximum position defilade, partial defilade, and direct lay areas.

f. **E**- Enfilade fires. Attempt to strike the enemy so that the long axis of the beaten zone coincides with the long axis of the target.

g. **E**- Economy. Always engage targets with appropriate weapons systems in order to maximize effectiveness of various ammunition types and to conserve ammunition on all systems. Do not engage single enemy personnel with machine guns.

h. **P**- Protection. This obvious consideration demands the careful construction of fighting positions, and the proper construction of alternate positions to the maximum extent possible. When the guns reveal their positions by firing, maximum attention will be brought to their destruction by the enemy. Their positions must be altered frequently, and new positions must be awaiting their relocation in order to minimize loss of their fires. Both cover and concealment are critical.

11. **References**

a. FMFRP 6-15, Machine Guns and Machine Gun gunnery.

b. The Rise and Fall of the "Emma Gees" by Captain K. A. Nette.

Appendix A

Range Cards

1. **Purpose**. A range card is a rough terrain sketch that serves two purposes: as a record of firing data, and as a document for defensive fire planning.

2. **Preparation**. Two copies are prepared. One is passed up the chain of command to assist in the preparation of the unit's fire plan sketch. The other stays with the gun(s) to assist in the potential turnover of a firing position to another gun team.

3. **Walking the FPL.** An important aspect of preparing a range card for machine guns is the walking of the FPL. This is done whenever practical and possible and is done after the machine guns are set in firing positions to cover assigned sectors of fire and FPLs. The purpose of walking the FPL is to ascertain the extent of grazing fire and dead space, the latter of which must not only be noted on the range card but must be covered by another weapons system. The following steps should be followed when walking the dead space:

a. The gunner places himself behind the gun, sets his sight on the limit of grazing fire and lays the gun on an aiming point along the FPL.

b. The A-gunner walks the FPL using a standard and measured pace.

c. When the A-gunner drops off into a space where the gunner can no longer see him below the shoulder, the gunner shouts "MARK."

d. The A-gunner, on his pace card, records the number of paces he has covered to the point. This is continued until the A-gunner reaches the limit of grazing fire for the weapon.

e. This information is then incorporated into the range card.

Recording Information

An FPL is drawn as a heavy line, shaded to signify grazing fire. (See Figure 1.) Gaps are left in the heavy line to indicate dead space. The range is recorded to the near and far ends of the dead space and to the maximum extent of graze along the FPL. The firing data needed to engage this target and the magnetic azimuth (measure with a compass) is written on the range card. Although the range cards are not required to be drawn to scale, the magnetic azimuth will aid the higher headquarters to do so if necessary.

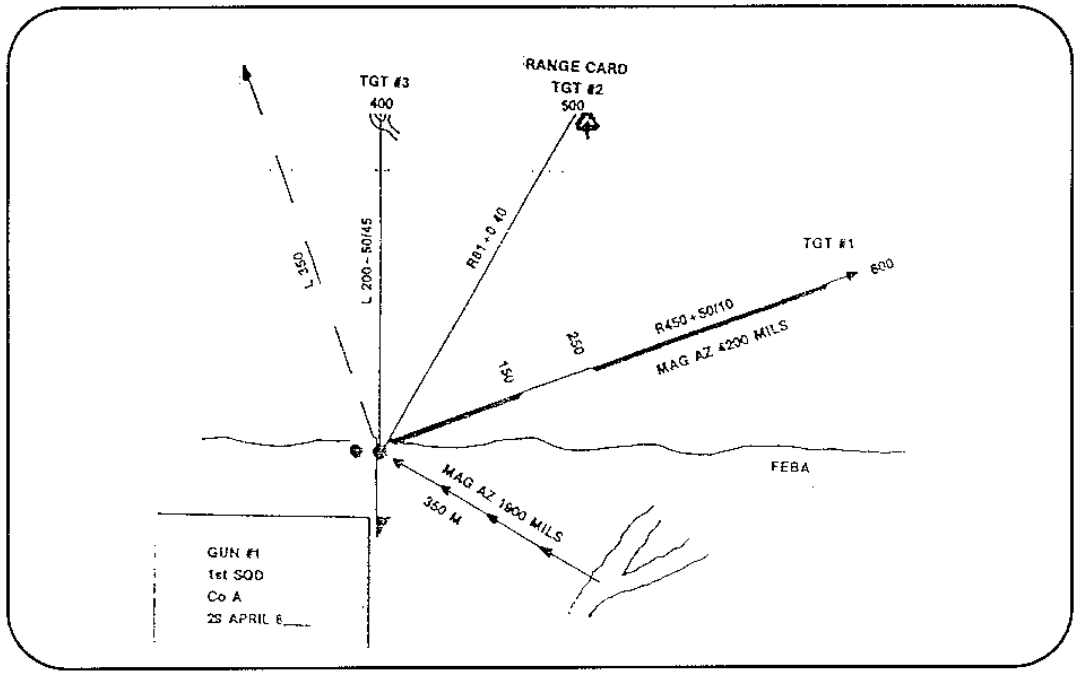

Figure 1. Range cards with a final protective line.

Sector limits are designated by dashed lines and named either the right or left sector limit. The firing data is recorded. The elevation reading is not necessary using the T&E method, since the sector limit is a limiting point only and not subject to predetermined fire.

Other targets of tactical significance are predetermined, then sketched and recorded on the range card.

The targets are numbered consecutively from the FPL. The FPL is always target number one. When a principal direction of fire is the final protective fire, targets are numbered starting from either side.

The PDF is drawn as a solid line with an arrow, and the range is recorded to the near end of the avenue of approach. The firing data and a magnetic azimuth are also written in. (See Figure 2.)

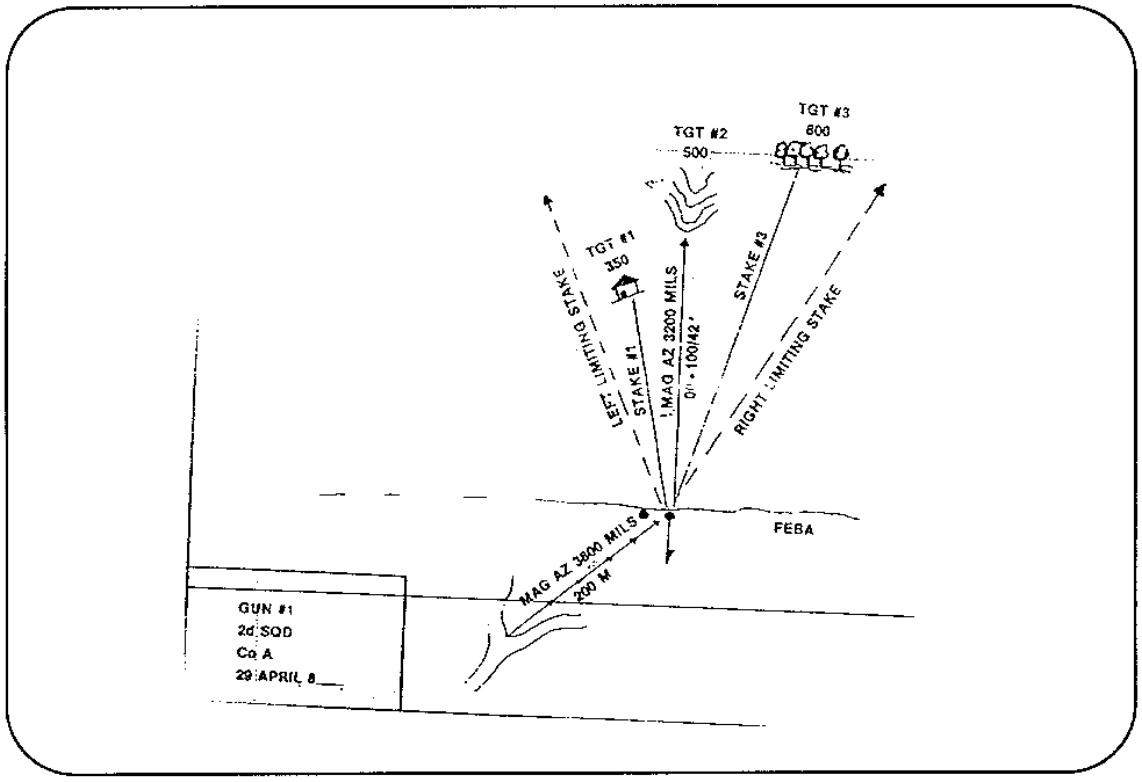
TGT #3
600
TGT #2
500
TGT #1
350
LEFT LIMITING STAKE
STAKE #1
MAG AZ 3200 MILS
STAKE #2
RIGHT LIMITING STAKE
FEBA
MAG AZ 3800 MILS
200 M
GUN #1
2d SQD
Co A
29 APRIL 8___

Figure 2. Range card with a principle direction of fire.